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APPLICATION NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
08/818,289	03/14/97	STARK	E 653,001US1

EXAMINER
ROSENBERGER, R

ART UNIT	PAPER NUMBER
2505	44

25M1/0314  
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DATE MAILED: 08/14/97

This is a communication from the examiner in charge of your application.  
COMMISSIONER OF PATENTS AND TRADEMARKS

### OFFICE ACTION SUMMARY

- ☐ Responsive to communication(s) filed on \_\_\_\_\_
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 D.C. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

#### Disposition of Claims

- ☒ Claim(s) 1, 6, 7, 11-15, 17-19, 22-26, 33-43, 45-53, 56-68 is/are pending in the application.  
Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- ☒ Claim(s) 11-15, 17-19, 22-26, 33, 43, 45-53 is/are allowed.
- ☒ Claim(s) 1, 6, 7, 33, 34, 36, 43, 56-68 is/are rejected.
- ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- ☐ Claim(s) \_\_\_\_\_ are subject to restriction or election requirement.

#### Application Papers

- ☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- ☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. § 119

- ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- ☐ All ☐ Some\* ☐ None of the CERTIFIED copies of the priority documents have been
- ☐ received.
- ☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_
- ☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

- ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e).

#### Attachment(s)

- ☐ Notice of Reference Cited, PTO-892
- ☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). \_\_\_\_\_
- ☐ Interview Summary, PTO-413
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Notice of Informal Patent Application, PTO-152

—SEE OFFICE ACTION ON THE FOLLOWING PAGES—

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 6, 7, 33, 34, 36-42 and 56-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art discussed on pages 2-4 of the instant specification and Borsboom (US 4,884,891) in view of Howarth (US 3,994,602) and Hirao et al (US 5,057,695).

The specification, on page 3, states that "typically" in the prior art interactance measurements are made using a "central aperture surrounded a small distance away by a ring aperture"; a "ring aperture" would at least obviously be circular. Borsboom shows an arrangement with this structure, with a central aperture 2 and a circular ring 7 around the central aperture some distance apart; see figure 4 in particular. The ring of the prior art and of Borsboom are "extended in length" with "the total length of said extended surface area being substantially greater than the mean distance separating" the two areas defining the light path through the material. The arrangement of the prior art in the specification discloses only a single path through the sample.

It is known in the art to measure light passing through a material at two

different distances; Borsboom teaches a second path though the object (scattered directly back) and both Howarth (figures 6 and 7) and Hirao et al (figures 2 and 4) teach two different path lengths through the material, neither directly back. It thus would have been obvious to provide means, as in Howarth and Hirao et al, to measure to different distances through the material being tested, because the art recognizes that this is useful. It would have been a straight-forward and obvious manner to do this in an arrangement such as shown by Borsboom of adding a second ring at the desired second distance. Borsboom teaches, or at least clearly suggests, including a plurality of rings; in column 3 beginning on line 61 and running through column 4, line 1, that reference teaches

"...a sensor head could be made in which a large number of juxtaposed optical fibers of diameter  $d$  is *arranged concentrically around a central optical fiber with an increasing radius*. Measurements made with such a sensor head gives a good picture of the amount of reflected light that has entered the *fibres arranged concentrically in rings*, and hence of *the light reflection as a function of the distance from the light beamed into the material being investigated...*" (emphasis added).

This at least clearly suggests placing fibers in rings (plural) concentrically around the central fiber at different distances.

Hirao et al teaches that it is known that the two different length light paths through the object can be obtained either by having one detector and two light sources (figure 2) or one light source and two detectors (figure 4).

In figure 4, Howarth shows that placing the light detector or transmitter at an angle to direct the light toward, or detect the light from, the other end of the

light path through the material.

Hirao et al shows, in figure 5, that it is a known technique to place the illumination and the receivers on opposite sides of the object being measured.

The use of other arrangements than concentric circles for the illumination and detection areas would be obvious because it is the transmission of light through the material, and not the particular geometry of the light source and detectors, that is of functional importance.

3. Claims 11-15, 17-19, 26 and 53 appear to be allowable; the art does not appear to teach the probe with a tip having a plurality of rings and having fiber bundles being disposed so that the applied and directed light travel through different paths through the specimen.

Claims 22-25 appear to be allowable; the art does not show the use of such a probe with an additional light source or detector on the far side of the object.

Claims 35, 43 and 45-52 appear to be allowable; the art does not appear to teach using an optical arrangement in contact with an object to measure bulk scattering and the same arrangement at a distance to measure reflectance.

4. The arguments filed 14 March 1997 have been considered but are not

persuasive. That there are structural differences between the rejected claims and the structure shown by Borsboom is of course correct; the rejection is in no way based upon any allegation that there are not. Note that the rejection is made under 35 U.S.C. 103, and Borsboom is applied in combination with other references which illustrate the obviousness of that which is claimed in the rejected claims.

It is of course correct that Borsboom shows, in the device of the figures of that reference, only a single ring of fibers surrounding the central illumination fiber bundle, with the second light path through the object being provided by fibers intermixed with the illumination fibers in the central bundle. This is noted in the statement of the rejection, which is in no way based upon any other interpretation of that embodiment of that reference. The Borsboom reference does at least clearly suggest additional rings at different distances from the central fiber (column 3, line 60 through column 4, line 2), and those in the art otherwise known the usefulness of measuring two different length light paths through a scattering body neither of which are directly back, this is illustrated by Hirao et al and by Howarth. Thus it would have been at least obvious to provide one or more additional surrounding rings of fibers in the basic construction of Borsboom.

The remarks argue that (some of the) claims set forth that the rings are the illumination fibers and that the central fibers comprise the receiving means, and argue that this is advantageous. Hirao et al teaches that two light paths of different lengths may be established through an object either by having a single illumination

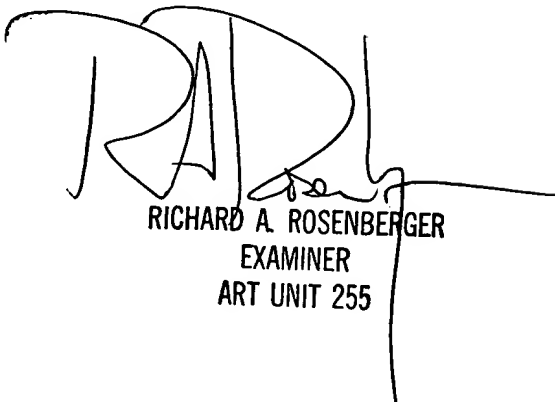
means and a plurality of detectors spaced at different distances, or by means of a single detector and a plurality of illumination sources spaced at different distances. Thus, given that would have been obvious to provide central illumination and a plurality of different spaced rings of receivers, it would have obvious to reverse the light paths and provide a single detector and a plurality of surrounding illumination means.

5. Papers related to this application may be submitted to Group 2500 by facsimile transmission. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The fax number is (703) 308-7722.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to R. A. Rosenberger whose telephone number is (703) 308-4804.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956.

R. A. Rosenberger  
13 August 1997



RICHARD A. ROSENBERGER  
EXAMINER  
ART UNIT 255